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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF OREGON

PORTLAND DIVISION

OREGON NATURAL DESERT ASS'N,

Plaintiff,

v.

JOHN RABY, Acting Director, BLM, *et al*.,

Defendants.

No. 3:25-cv-363-HZ

DECLARATION OF J. BOONE KAUFFMAN, Ph.D.

I, J. BOONE KAUFFMAN, Ph.D., state and declare as follows:

1. My name is J. Boone Kauffman. I am a research ecologist with nearly 50 years of experience studying fire ecology, riparian ecology and management, and how livestock influence rangeland and sagebrush ecosystems. The following matters are personally known to me, and if called as a witness I would and could truthfully testify thereto.

2. I submit this declaration to explain why specific scientific research first called for in the Bureau of Land Management's (BLM) 2015 conservation plan for greater sage-grouse (*Centrocerus urophasianus*) (hereinafter "sage-grouse") in Oregon is a crucial piece of BLM's strategy for managing sagebrush habitat and keeping the bird from going extinct. I also explain why it is critical that the approximately 22,000 acres in thirteen Research Natural Areas (RNAs) which BLM decided to make unavailable for grazing ten years ago remain off-limits to domestic cattle this year and in the future to function as ungrazed controls that would facilitate for scientific research to begin, despite the closed areas being greatly pared back in the agency's 2025 plan. And I describe the harm to efforts to conduct scientific research and implement scientific management of livestock grazing that would result if the approximately 18,000 acres within the RNAs that were ungrazed during 2023 and 2024 were reopened to grazing this year.

3. I submitted two prior declarations on this very same topic in the related case, *Oregon Natural Desert Association v. Bushue*, No. 3:19-cv-1550-SI. The first of those was dated February 24, 2022, docket number ECF 58 in that case, and the second was dated March 17, 2022, docket number ECF 77 in that case. I incorporate those declarations here by reference, and continue to stand by my statements in each of them, including my overarching opinion that we cannot afford further delay in implementing closures to establish permanent ungrazed reference areas and begin gathering crucial, currently lacking, scientific information to inform the BLM's management of sage-grouse habitat in Oregon.

PROFESSIONAL BACKGROUND

4. I have a B.S. in Range Management from Texas Tech University (1978), a M.S. in Rangeland Resources from Oregon State University (1982), and a Ph.D. in Forest Ecology from the University of California, Berkeley (1986). For informational purposes, I am also a

Professor, Senior Research in the Department of Fisheries, Wildlife, and Conservation Sciences at Oregon State University. I have been affiliated with Oregon State University from 1986–2003 and 2011–2022. From 2003–2010, I was a research ecologist/biologist with the USDA Forest Service Pacific Southwest and Northern Research Stations. I am also the lead scientist/owner of Illahee Sciences International LLC, which is a small research consulting business focusing on the interactions of land use, biological diversity, and climate change. I have provided research and consulting services for corporations, non-governmental organizations, and federal government agencies, such as the United Nations and USAID, throughout the world.

5. My teaching, research, and other professional activities over the past 40 years have involved a broad array of topics in riparian, wetland, and rangeland settings associated with vegetation ecology, biogeochemistry, restoration, climate change, fire ecology, and sustainable management. I have published over 275 scientific publications and book chapters, many of which relate to the impacts of cattle on ecosystem structure and function as well as the restoration of native ecosystems. With regard to livestock grazing in southeastern Oregon, I listed 14 publications, in paragraph 4 of my first prior declaration (docket number ECF 58 in *ONDA v. Bushue*) that are particularly pertinent to these issues. In addition to those, the following new publications are also pertinent:

Kauffman J.B., Beschta R. L, Lacy P.M., Liverman M. 2022a. Livestock on public lands of the western USA accentuate effects of climate change: Implications for mitigation and adaptation. Environmental Management, https://doi.org/10.1007/s00267-022-01633-8.

Kauffman J.B, Coleman G., Otting N., Lytjen D., Nagy D., Beschta R.L. 2022b. Riparian vegetation composition and diversity shows resilience following cessation of livestock grazing in northeastern Oregon, USA. PLoS ONE 17(1): e0250136. https://doi.org/10.1371/journal.pone.0250136.

Kauffman J.B., Beschta R. L., Lacy P.M., Liverman M. 2023a. Forum: Climate, ecological, and social costs of livestock grazing on western public lands.

Environmental Management 72:699–704 https://doi.org/10.1007/s00267-023-01853-6.

Kauffman J.B., Cummings D.L., Kauffman C.I., Beschta R.L., Brooks J., MacNeill K., and W.J. Ripple. 2023b. Large ungulate influences on composition and diversity of riparian plant communities in Yellowstone National Park. *Ecosphere*. https://doi.org/10.1002/ecs2.4406.

Kauffman, J.B., Souza, F.M., Costa, R.F., da Silva A.E.B., Ferriera T.O., Megonigal, J.P., Ritonga R., Gangga, A., Novita, N., Pacheco C.F.O., Bernardino A.F. 2024. Conversion of tropical forests to water buffalo pastures in lower Amazonia: Carbon losses and social carbon costs *Ecosphere* 15(12): e70055. https://doi.org/10.1002/ecs2.70055.

Kauffman J.B., Cummings D.L., Beschta R.L, and W.J. Ripple. 2025. Ungulate influences on quaking aspen and willow communities in the Greater Yellowstone ecosystem. Ecosphere. (In review).

Ripple, W.J., Wolf, C., Phillips, M.K., Beschta, R.L., Vucetich, J., Kauffman, J.B., Law, B.E., Wirsing, A.J.,Lambert,J.E., Leslie, E., Vynne, C., Dinerstein, E., Noss, R., Wuerthner, G., DellaSala, D.A., Bruskotter, J.T., Nelson, M.P.,Crist, E., Darimont, C. Ashe D.M. 2022. Rewilding the American West. Bioscience 72:31–935. https://doi.org/10.1093/biosci/biac069

6. I include as **Attachment A** to this declaration a copy of my *curriculum vitae*.

7. Since 1978, I have conducted and led numerous research studies, field reviews, and other scientific and educational endeavors in the riparian zones, shrub-steppe, grasslands, and forests of eastern Oregon, other western states and in many other regions of the world (30 countries in Africa, South America, Oceania, and Asia). The domestic research includes studies of riparian ecosystems, wetlands, aspen communities and sagebrush ecosystems throughout the Great Basin and Intermountain West (12 western states). I have conducted research on the effects of fire and grazing in such places as Steens Mountain, Hart Mountain, John Day Fossil Beds National Monument, Lava Beds National Monument and Yellowstone National Park. Riparian studies have specifically quantified the character of riparian areas, the multiple influences of livestock (and large ungulates) on riparian vegetation and approaches to their recovery. We have

also conducted studies examining the role and effects of fire on the composition and structure of sagebrush ecosystems including effects on key forbs of the sage-grouse diet.

8. My international work has focused on how land use/land cover change affects the biological diversity of ecosystems and how land use/land cover change (including conversion (to cattle pastures) contributes to climate change. I have served on the Intergovernmental Panel on Climate Change (IPCC) as part of the USA scientific contingent.

9. In addition, I have served as major professor for undergraduate and graduate students on projects located at Steens Mountain and Hart Mountain and many other areas of eastern Oregon and the Intermountain west. These projects have documented the recovery of riparian zones following cessation of grazing, the effects of fire on sage-grouse habitats and the general ecology of sage-grouse. We have found that rest from grazing for at least 20 years resulted in dramatic improvements in riparian, aspen, and upland habitats for threatened species such as sage-grouse as well as many migratory songbirds that depend upon riparian zones for nesting and brood-rearing success. Following extended periods of rest from grazing we have quantified similar positive responses in the biological diversity, and structure of quaking aspen, willow, and wetland meadows, along many of eastern Oregon's streams and rivers where long-term livestock grazing has occurred—including areas in and near the RNAs and grazing allotments at issue in this case.

INFORMATION REVIEWED

10. In addition to the BLM's 2015 sage-grouse conservation plan for Oregon (commonly referred to as the "2015 ARMPA") and supporting documents I reviewed in preparing my declarations in the earlier case, I have now also reviewed the BLM's 2025 Greater Sage-grouse Rangewide Planning Record of Decision and Approved Resource Management Plan

Amendment for Oregon (commonly referred to as the "2025 ARMPA") and accompanying 2024 Final Environmental Impact Statement (FEIS). I paid particular attention to the plans' provisions related to closure to livestock grazing of specified acreages of public lands in 13 separate "key" RNAs, for purposes of creating and studying what the BLM originally, in the 2015 ARMPA, described as "undisturbed baseline reference areas for the sagebrush plant communities they represent that are important for Greater Sage-grouse." In the 2025 ARMPA, the BLM reduced the ungrazed areas to about 3,763 acres in eight of the 13 key RNAs, making approximately 18,016 acres that were ungrazed under a court order during 2023 and 2024 again available for grazing. For three of the key RNAs now fully re-allocated to grazing (North Ridge Bully Creek, South Ridge Bully Creek, and Spring Mountain), BLM indicates it will install small, 5-acre or smaller exclosures instead of the larger closure areas originally approved in 2015 (though BLM does not state where exactly those 5-acre plots will be located nor what communities will be included). The other two (Black Canyon and Dry Creek Bench) will not even have these types of small exclosures installed.

11. I also have reviewed pertinent scientific literature. The list of this scientific literature is too lengthy to provide here. In addition to the works cited above in paragraph 5, I have placed at the end of this declaration a References Cited section comprised of the peer-reviewed scientific papers from which specific information is drawn in this declaration.

12. I am extremely familiar with sagebrush ecosystems and their habitats as a result of conducting field research in these landscapes in eastern Oregon and the Intermountain West for 47 years and I drew on this professional experience and judgment to write this declaration.

13. In my review I drew on my extensive experience in conducting applied research where exclosures and ungrazed reserves were an essential feature of the studies (see the

references section and vitae). This includes research in riparian zones, many different sagebrush ecosystems, wetlands, western Juniper, and quaking aspen ecosystems. Our understanding of how both domestic livestock and wild ungulates influence natural ecosystems is largely based upon studies where sites that were grazed are the experimental treatments and the exclosures/reserves function as experimental controls. This research has greatly improved our understanding of livestock influences on avian populations, small mammals, fish populations and their habitats, native and exotic plant species, fire ecology, carbon sequestration, nutrient cycling, and climate change. But ungrazed sites must be representative of the habitats that one wishes to study. Unfortunately, the minuscule fraction of the 12-million-acre sage-grouse habitat that BLM proposes leave ungrazed is woefully inadequate.

14. My research focus also includes how livestock grazing affects the semi-arid landscapes in southeastern Oregon with respect to climate change (see Kauffman 2022, Kauffman et al. 2022a, Kauffman et al. 2023a). Livestock grazing is a significant source of greenhouse gases, and grazing impacts greatly exacerbate the impacts of climate change in a multitude of ways. This includes significant carbon loss due to the degradation of native sagebrush to dominance by annual grasses. Seeding crested wheatgrass to improve livestock forage, as a fuel break, or following wildfire is another kind of grazing-related type conversion which results in the loss of aboveground carbon stocks.

15. Finally, I have spent considerable time on numerous occasions over the past 47 years in sagebrush landscapes throughout southeastern Oregon and the Intermountain West. This includes teaching, mentoring students, conducting workshops and leading applied research in places including Hart Mountain, Steens Mountain, the John Day Fossil Beds National

Monument, the Lava Beds National Monument, and BLM and US Forest Service-administered lands throughout eastern Oregon.

DISCUSSION

16. I submit this declaration to describe the importance of the scientific research in key RNAs established in the BLM's 2015 sage-grouse plan for Oregon and the harm to my interests as a scientist who wants to study these areas—and, more broadly, the harm to efforts at implementing science-based management of grazing on public lands in Oregon—if grazing were to resume on the approximately 18,016 acres of key RNA lands made available for grazing under the 2025 ARMPA after two years of court-ordered exclusion of livestock. Again, I also refer the reader back to the discussions I offered in my two declarations in the prior case.

Importance of Ungrazed Baseline Reference Areas

17. In sum, I previously observed that the approximately 21,779 acres in 13 key RNAs that BLM made unavailable for grazing in 2015 across different parts of southeastern Oregon's vast sagebrush landscapes were identified because they represent unique and distinct places that would provide "key" information about how sagebrush plant communities respond in the absence of disturbance from livestock grazing. I agreed with the BLM's assessment that "there is a lack of ungrazed comparison areas for evaluating livestock impacts on seasonal needs of Greater Sage-Grouse" (BLM 2018). I agreed with the BLM's conclusion that "the lack of large representative tracts of ungrazed habitat makes it *nearly impossible* to determine and monitor the actual consequences of livestock grazing" (BLM 2018) (emphasis added). Making these 21,779 acres, in these 13 key RNAs, unavailable for grazing was a logical and practical approach to address these needs.

18. The BLM was on strong scientific ground when it stated that the express purpose of the key RNAs is to (1) provide "baseline vegetation information to document successional changes," (2) serve as "areas for comparison" to grazed areas, and (3) "document vegetational shifts" in plant communities over time as they are affected by climate changes. Oregon 2015 ARMPA FEIS at 8-21. Following this scientific approach would allow BLM to make conclusions on how grazing at different seasons, and intensities and in different plant communities would affect biological diversity, plant composition, wildlife habitats, and climate and fire effects in brush landscapes. This cannot be reasonably established if there is no ungrazed control.

19. I understand that, to date, the BLM has only fenced off half of one of the key RNAs (Foley Lake). Scientific research based on reliable, up-to-date, and pertinent baseline data is the lynchpin of any meaningful and informed wildlife or habitat conservation plan. Without such research and baseline information, the BLM continues to act without a crucial component of its sage-grouse conservation plan.

20. Ungrazed reference areas or livestock exclosures are essential research tools for the study of ecosystem processes, recovery, and to better inform livestock management (Sarr 2003, Coles-Ritchies et al. 2007, Kauffman et al. 2022a, Kauffman et al. 2022b, Kauffman et al 2023a, Kauffman et al. 2025, see also Table 1 below). Kauffman et al. 2022b, an article I co-authored, compares grazed and ungrazed reference sites in several of the national forests of eastern Oregon and illustrates how riparian vegetation composition and resiliency improves when livestock are excluded—and the sort of scientific study that will be possible when the key RNAs are closed and recovery begins. The article is attached as **Attachment B**.

21. A major advantage of using ungrazed sites comparable to or in close proximity to grazed sites is that environmental site variability (precipitation, geology, flow regime, etc.) is practically the same for adjacent or comparable grazed and ungrazed areas, thus isolating the potential influence of livestock (or livestock removal) (Sarr 2003). I assume this is why the BLM chose and configured the 13 different sites and 21,779 acres that it did, in 2015, explaining that these were the "minimum number of sites and areas necessary" to provide statistically significant data and "support a coherent research plan" (BLM 2018).

22. The scientific method consists of systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses. In terms of ascertaining influences of livestock on natural ecosystems, reference sites are an essential part of the scientific method. In my prior first declaration, I provided Table 1, listing the many important examples of scientific breakthroughs throughout the world arising from studies that utilized ungrazed reference sites (livestock/large ungulate exclosures) and that led to improved natural resource management. I am providing an updated version here. Establishment of the ungrazed reference areas closed in the 2015 plan would provide these opportunities in southeastern Oregon. Without reference areas, the BLM cannot credibly interpret trends in plant or habitat recovery. Without reference areas, the BLM lacks a crucial baseline against which to understand whether or not conservation management measures undertaken in grazed areas are working. And without the same number and areal scope of reference areas the BLM itself deemed the "minimum number of sites and areas necessary," any research confined to the roughly 3,700 acres in eight key RNAs (plus three small exclosures at undisclosed locations on three others, and two others closed in previous planning processes) is likely to fail to provide the diverse suite

of biologically meaningful, and statistically significant controls needed to support science-based management of grazing in eastern Oregon.

Table 1. Examples of scientific discoveries arising from studies that utilized ungrazed reference sites (livestock/large ungulate exclosures) leading to improved natural resource management.

Ecosystem Component	Finding within exclosures	Citation
Invasive and alien species	Decreases in abundance of exotic/invasive species in exclosures	Kauffman et al. 2022a; Schlutz and Leninger (1990) Kauffman et al. (2022b) Kauffman et al. (2025)
Wildlife habitat	Shifts in avian guilds, composition and densities, increased avian diversity in exclosures	Kauffman et al. (1982) Kauffman et al (1990)
Structure and growth of willows aspen and other keystone species	Rapid recovery following cessation of livestock grazing in reference sites	Beschta et al. (2014); Case et al. (1997); Brookshire et al. (2002)
Forbs/herbaceous composition	Increases in native forbs, grasses, and sedges in exclosures; increases in species diversity in exclosures	Kauffman et al (1983); Kauffman et al. (2022a); Wroblesky & Kauffman (2003) Kauffman et al. (2023)
Willow reproduction/increased abundance of berry producing plants	Increased willow reproduction in exclosures	Brookshire et al (2002) Kauffman et al. (2025)
Riparian/wetland composition	Increase wetland-obligate and facultative wetland plant species in exclosures	Coles-Ritche et al. (2007); Kauffman et al. (2022a) Kauffman et al. (2023)
Influences of climate change	Grazing resulted in drier conditions thus exacerbating climate change; increases in carbon stocks in exclosures	Kauffman et al. (2004) Kauffman (2022a); Kauffman et al. (2022b)
Stream channels	Channels in ungrazed reaches were narrower, deeper, and had more pool area than the channels in grazed reaches.	Magilligan & McDowell (1997); Kauffman et al. (1993); Beschta et al. (1991)
Fish populations	Increased juvenile salmonids, enhanced salmonid habitat	Kauffman et al. 2002; Li et al. (1994)
Large ungulate (livestock) effects on climate change	Greenhouse gas emissions, carbon sequestration and how cattle exacerbate climate change effects	Kauffman et al (2022) Kauffman et al. (2023a) Kauffman et al. (2024)

23. Establishment of the ungrazed reference areas closed in the 2015 plan would provide these opportunities in southeastern Oregon. Without reference areas, the BLM cannot

credibly interpret trends in plant or habitat recovery. Without reference areas, the BLM lacks a crucial baseline against which to understand whether or not conservation management measures undertaken in grazed areas are working. And without the same number and areal scope of reference areas the BLM itself deemed the "minimum number of sites and areas necessary," any research confined to the roughly 3,763 acres in eight key RNAs (plus three small exclosures at undisclosed locations on three others, and two others closed in previous planning processes) is likely to fail to provide biologically meaningful, and statistically significant controls needed to support science-based management of grazing in eastern Oregon.

24. The scientific discoveries arising from studies of ungrazed reference sites cited in Table 1 above led to new understandings with regard to many ecosystem components. These include invasive and alien plant species, wildlife habitat, structure, growth and reproduction of willows, aspen and other keystone species, forb and herbaceous composition, riparian and wetland composition, stream channels and fish populations, and the influences of climate change. In the three years since I submitted my previous declarations, additional studies have been published (7 publications in peer-reviewed journals, and the databases listed in Paragraph 5). The ungrazed key RNAs established by the BLM here will—if actually and fully implemented—lead to new discoveries with regard to how various plant communities in the sagebrush landscape that are vital to sage-grouse respond in the absence of grazing. This is essential information that the BLM is, by its own admission, currently lacking in southeastern Oregon.

25. As I described previously, monitoring habitat conditions informs adaptive management and helps land managers assess whether their plan's conservation measures are working. In Oregon, the BLM explained that scientific research in the key RNAs closed to

livestock grazing was important to the agency's ability to assess the impacts of grazing and associated grazing management actions on sage-grouse, and for gauging the effectiveness of the BLM's sage-grouse plan grazing measures. As I have already noted, the BLM stated that the 15 areas (the 13 newly closed areas, plus two others that had been closed to grazing in prior planning processes) and acres (35,651) "were considered the **minimum size and placement** needed to provide a **sufficient land base** and **mix of vegetation types** to **meet the research need and retain the statistical power and scope of inference that could be extrapolated over the planning area as a whole** and into adjoining states," which the Bureau also characterized as the "**minimum number of sites and areas necessary**" to provide "**sufficient replication and support a coherent research plan that would provide data with the statistical power**" to extrapolate the results across all sage-grouse range in Oregon (BLM 2018). I see nowhere in the BLM's 2025 ARMPA or the accompanying 2024 FEIS where the BLM explains why fewer sites and acres now will suffice. This is understandable as there is no scientific rationale that could justify this.

26. The more than 12 million acres of BLM-managed public lands that make up the range of the sage-grouse in Oregon represent an extremely complex and diverse array of physical and environmental conditions across the state. In order to understand how land management affects the resources public land managers are entrusted to manage, at least 1% of the sites should function as controls (ungrazed or un-manipulated sites). Further they should be distributed throughout their range. Think of medical research. The amount of land BLM identified in the 2025 ARMPA to serve as ungrazed baseline reference areas (totaling only 17,635 acres, including only 3,763 newly-closed) would be akin to administering a controversial medical treatment to 681 patients with only a single patient serving as the control. Just as a single

individual is not representative of a population in medical research, the amount of ungrazed land proposed in the 2025 ARMPA is an unbalanced and woefully inadequate testing strategy.

27. In the 2025 ARMPA the number of ungrazed sites has been reduced to 10 sites from 15 in the 2015 ARMPA. And, one site near the California border (Guano Creek-Sink Lakes closed under a previous planning process), now encompasses 63% of the ungrazed area. This is not an adequate sample size and is a wholly inadequate distribution to meet the BLMs management needs. There are simply too many critical plant associations and key habitat features that are not represented in these areas. While meaningful scientific data could be obtained from the 35,651 acres that were closed after the 2015 ARMPA this is still a very minimal effort (less than 0.03% of the grazed areas of BLM-managed public lands) and in my opinion, still far below the minimum number of sites and areas and land area necessary to truly provide "sufficient replication and support a coherent research plan that would provide data with the statistical power."

28. The BLM proposal to reduce its own "minimum number" even further is a self-defeating pathway that will not provide agency land managers with the information they need to informedly and sustainably manage these public lands. A more appropriate minimum set of baseline reference areas would encompass ungrazed expanses all of the environments, elevations, soils, and plant community assemblages (plant communities or habitat types) of the 12-million-acre sage-grouse range managed by the BLM. The 15 identified sites fall short of this, and the revised BLM proposal here is far worse. Based upon my scientific experience, especially working in ecosystem inventories for land management throughout the world, I would recommend a minimum of 1% of the 12 million acres be set aside as ungrazed controls (*i.e.*, about 120,000 acres of reference areas, rather than the approximately 22,000 acres newly

established by the 2015 ARMPA plus the 13,872 acres closed previously—let alone the mere 3,763 acres (plus the 13,872 acres previously closed) now adopted in the 2025 ARMPA.

29. While small exclosures can be useful for some studies they are inadequate to monitor or address many of the critical management approaches of the BLM. The EIS seems to only address the need to monitor grazing of key "forage" species for livestock in selected sagebrush communities (*i.e.*, the main plants that are useful as food for grazing cattle, as opposed to those sagebrush and other plant species (and insects) that are essential as food and cover to sage-grouse). The BLM's decision to significantly reduce its ungrazed study areas will make it impossible to generate useful information because so many sagebrush environments (habitat types) throughout the bird's range would not be included. Further, keystone ecosystems such as riparian zones, springs, quaking aspen, grasslands, etc., are not included.

30. In designing adequate ungrazed controls for the sage-grouse range, considerations of the animal needs as well as the diversity of the landscapes present must be incorporated. Neither of which was considered in the 2025 ARMPA. Beyond simple monitoring of forage species for cattle in sagebrush communities is the need to monitor plant succession, biological soil crusts, watershed health, post-fire response, and other wildlife communities. This should occur in all the key plant associations used by sage-grouse as well as sites of habitat that have been degraded (exotic communities). To monitor riparian zones and water resources a paired (grazed/ungrazed) watershed approach is most effective for comparison of water yield, water quality, and riparian/wetland health. Ideally, sage-grouse populations should be monitored in both grazed and ungrazed habitats. Their migratory movements (often >20 km) and large annual home ranges (4-615 km^2 or about 988 – 152,000 acres) (Connelley et al. 2011) suggest large ungrazed sites are required for monitoring purposes. For monitoring sage-grouse populations and

habitats, and to ascertain grazing influences on them, there should be replicated (*i.e.*, at least three) grazed and ungrazed habitats at the scale of the home range (that is, that 20km or greater area that sage-grouse often move around in during their seasonal and annual life cycles).

31. While inadequate to meet the management needs of the BLM with respect to the vast range of the sage-grouse in Oregon, the 13 sites and 21,779 acres newly identified in 2015 are, when added to the two sites previously closed, nevertheless, a really important start that would provide valuable information to the BLM allowing the agency to better manage the public lands under its stewardship. As such, the BLM should actually establish (physically fence off) these ungrazed reference sites as soon as is possible. In short, this is a good, but minimal start.

32. By removing grazing from these areas, the BLM can study how some unique sagebrush, grassland, and riparian ecosystems will respond to the absence of this otherwise pervasive land use. These places could serve as undisturbed baseline reference areas for semiarid cold desert landscapes that they represent. Without reference areas, the BLM is unable to make informed decisions and "adaptively manage" surrounding lands that continued to be permitted for grazing. I understand that "adaptive management" is an important part of the 2015/2025 ARMPA with regard to livestock grazing; but without establishing—and now by significantly reducing—the ungrazed key RNAs, the BLM dramatically undermines its ability to follow through on this plan requirement.

33. Because there are almost no ungrazed areas on BLM public lands within the range of the sage-grouse in eastern Oregon, the key RNAs grazing closure is crucial to the BLM's ability to understand the effects of its grazing decisions and management throughout Oregon's high desert on the sage-grouse. As the BLM has explained, even after the key RNA grazing closures, more than 12 million acres of BLM-managed public lands throughout eastern Oregon

will continue to be grazed under permits issued by the agency. The BLM also explains in its 2015 and 2018 EISs that the very few other ungrazed areas that could conceivably serve as reference sites were not feasible. For example, while there are some other RNAs already closed to grazing, none are within sage-grouse habitat. Other ungrazed lands, like the Hart Mountain, Sheldon, and Malheur wildlife refuges, are managed by the U.S. Fish and Wildlife Service where the BLM has no control over land management or potential study methods.

34. Because of the lack of ungrazed reference areas in the entirety of the ARMPA planning area of southeastern Oregon, the 13 sites established in 2015 would be of inestimable value in terms of their potential contributions to science and natural resource management. It is highly likely that these sites would be of value to researchers interested in how livestock affects semiarid ecosystems. This includes federal researchers with the United States Agricultural Research Service and the United States Geological Survey – Biological Research Division, as well as university researchers from institutions such as Oregon State University. For example, once the closures are fully implemented and the closed areas made off-limits to livestock, scientists (including me) could seek funding to collaborate with the BLM, NGOs, and other state and federal agencies to establish the long-term monitoring/research possible from such a network of ungrazed reference areas. This would provide valuable collaborative partnerships for the BLM and the American people.

35. However, it would be difficult for a scientist to justify research funding in proposals until there is a definitive resolution of the uncertainty associated with BLM's failure first to implement the 2015 ARMPA closures and then dramatically decrease the number and size of the closures in the 2025 ARMPA, and there is full implementation of closures so that exclusion from grazing is guaranteed. Likewise, no scientist could be certain that establishing

long term experiments comparing grazed vs ungrazed plant communities would not be destroyed by resumption of grazing or extensive trespass in the absence of fully-implemented ungrazed exclosures. In particular, this would devastate a graduate student working on their thesis or a young professor starting their career. I note that the BLM itself, which declared in the 2015 ARMPA the importance of and need for scientific research comparing ungrazed and grazed areas, has not begun any scientific studies in the closed key RNAs, either. I am interested in developing studies in these areas, and believed that, after the District Court ruled more than two years ago that the BLM should implement the 2015 closures without further delay, the day was close when we would have guaranteed ungrazed exclosures to allow research to begin. The 2025 ARMPA's decimation of the 2015 closures sets back yet again the date it will be reasonable to commit time and funding to begin studies.

36. There is a justified growing concern expressed by scientists, land managers, and the public about the joint crises of biodiversity loss and climate change. This includes the awareness of the inestimable value of BLM lands to address these dual crises (see Kauffman et al 2022a, 2023a). Sage-grouse populations are one indicator of how we, as a society, are addressing the biodiversity crisis. Further, the vast lands managed by the BLM can play a very important role in climate change mitigation and adaptation. For example, they have the potential, if managed more conservatively, to sequester incredible amounts of carbon in their soils and plant biomass, rather than having all of that carbon released into the atmosphere. Actions should be taken immediately to address these crises. Sites to monitor our natural resources managed by the BLM can play a critical role in determining how to address the biodiversity and the climate crises.

37. As such, the establishment of ungrazed reference areas is overdue, and we have lost valuable time and information as a result. Failure to immediately establish such sites will continue to result in irreparable and irrecoverable losses in information necessary for the BLM to make informed decisions on how to best manage not only sage-grouse populations but the entire landscapes in which they exist. And the BLM's decision to *reduce* the number and acreage of ungrazed key RNAs, and now allow livestock grazing on 18,016 acres of research areas that were made unavailable to grazing in 2015 and were closed to grazing in 2023 and 2024, similarly will result in an irreparable loss of invaluable baseline scientific information.

38. Allowing livestock into the areas that have been ungrazed by court order in 2023 and 2024 (indeed since the fall of 2022) will harm the scientific process by re-setting the baseline ungrazed condition to 2025 (or even later), discarding at least two years of hard-fought rest and the beginning of the progression of vegetation recovery in the absence of grazing available for eventual study. Even a small amount of grazing throughout one of the RNAs closed in 2015 but reopened in 2025 will render it unsuitable as an "ungrazed" reference site for comparison with grazed sites. Some profound changes in plant species composition and soil structure occurs the first few years following cessation of grazing (Kauffman et al. 1983a, Kauffman et al. 2022b) and changes would be erased with resumption of grazing or trespass.

39. And preserving the rest from grazing during 2023 and 2024, through an injunction, will allow scientific studies that begin when and if the 2015 closures are validated by the court and finally implemented to use the four or five years of ungrazed condition in later studying and comparing ungrazed and grazed areas. It is not necessary that data be collected in the first ungrazed year, so long as there is reliable information that a given baseline area has not been subject to grazing for a definite number of years. What is important is the presence of

comparable grazed and ungrazed sites from which to base conclusions. In our many studies comparing grazed and ungrazed ecosystems, exclosure establishment has ranged in years from 0 to 65 years prior to study (see Kauffman et al, 1983a, Kauffman et al 1983b, Kauffman et al. 2022a and Kauffman et al, 2025 for these extremes). I am confident that comparing the regenerating ecosystem components of a baseline reference area known to have been ungrazed for four or five years to nearby areas that have been grazed during that period will yield valuable scientific information. Allowing grazing to resume on 18,016 acres not grazed in 2023 and 2024 will harm future attempts to study those areas by obliterating the ungrazed baseline and setting back their "ungrazed" condition by several years and delaying yet again the time when meaningful comparisons of ungrazed to grazed areas can begin.

BLM's Justifications for Reducing Baseline Reference Areas

40. The total acreage of newly excluded (ungrazed) rangeland in the 2015 ARMPA totaled 21,779 acres. As I previously stated, this is not adequate to address all of the management needs of the 12-million-acre sage-grouse range managed by BLM in Oregon, but would still be of great value to guide land management. This was reduced to 3,763 acres in the 2025 ARMPA, which is an 83% decrease in area. This dramatic decrease in lands to serve as ungrazed controls to inform management on over 12 million acres of grazed lands cannot really be considered as a serious proposal.

The shortcoming of small exclosures compared to larger ungrazed areas.

41. The lack of large ungrazed areas encompassing the multitude of sage-grouse habitats from which to base studies is a fatal flaw of the 2025 ARMPA. The fewer and smaller exclosures proposed do not encompass all of the critical habitats used by sage-grouse, nor do they encompass the myriad of different and varied ecological impacts of cattle grazing on the

landscape. The 2025 ARMPA fails to recognize the tremendous variation in plant communities, microclimates, and ecological conditions of the sage-grouse range that are not covered with such a small area (0.00031 of the area of sage-grouse range managed by the BLM in Oregon). The 2025 ARMPA fails to recognize that there are distinct preferences by cattle as to where they graze just as there are habitat preferences for any animal on the range. For example, it has been well documented that cattle prefer riparian zones to upland communities (Kauffman and Krueger 1982). In one study in Northeast Oregon, the riparian zone accounted for 2% of the allotment area but >80% of the forage consumed by the cattle (Roath and Krueger 1982). A small exclosure cannot provide necessary information necessary to compare livestock grazing preferences and grazing influences on all plant associations/critical ecosystems across a landscape.

42. Small ungrazed sites (let alone the "5 acres or less" -sized exclosures BLM suggests it will establish in three of the eliminated large reference areas) will not provide land managers with the information they need for proper land and wildlife management. This requires sampling in all plant associations and at varying distances away from water sources. For example, livestock impacts (increases in invasive species, loss of biological soil crusts, and declines in bunchgrass density) have been found to be closely related to distance to water (Reisner et al. 2013). In addition, land managers need to know how different plant associations (all of the different riparian, sagebrush, aspen, juniper, and other relevant plant communities) respond to grazing. They need to know how soil types, elevation, topography, and aspect affect plant community composition and grazing response. They need to know how plant communities in varying degrees of ecological condition (completely intact to completely dominated by exotic

or non-native grasses) respond to grazing or rest from (absence of) grazing. But this cannot be accomplished with small ungrazed areas/exclosures.

43. The 2025 ARMPA will not provide adequate reference areas and acreages from which to base scientifically informed land management. The lack of representative ungrazed sites on BLM lands has been a recognized barrier and concern for sage-grouse management for decades (Beck and Mitchell 2000, Hockett 2002). These researchers and others, including BLM itself in 2015 and again in 2018, have noted that there was a lack of ungrazed rangelands for evaluating livestock impacts on the seasonal needs of greater sage-grouse. They noted the lack of large representative tracts of ungrazed habitat makes it nearly impossible to determine and monitor the actual consequences of livestock grazing.

Grazing intensity is important.

44. The landscapes of the Intermountain West that are dominated by what is commonly referred to as "big sagebrush" (*Artemesia tridentate*). These landscapes evolved over the course of thousands of years (since the last ice age) with little herbivore pressure until the introduction of livestock (Mack & Thompson 1982). Therefore, the presence of domestic livestock in Intermountain sagebrush landscapes where BLM decides whether or not to issue permits for grazing domestic livestock needs to be evaluated at any level of grazing pressure. Unaffected control sites are a basic tenet of the scientific method. This is true for all fields of scientific endeavor, ranging from medical research to range ecology research. Restoration and scientifically based grazing management requires ungrazed controls to understand how cattle influence ecosystems and key species of interest such as sage-grouse.

45. The BLM in the 2025 ARMPA suggests that "lightly grazed" (<20%) key RNAs are acceptable to serve as controls for land management. That statement is incorrect,

scientifically unjustified, and would result in bad decisions based upon faulty assumptions. The BLM particularly misconstrues the cited literature (Valentine 2000) leading to its incorrect conclusion. The citations are taken out of context, and the BLM's statements in the FEIS are contrary to the most basic principles of sustainable grazing management. Even Valentine (2000) stated that simplistic guides such as "utilization standards" (for example, what percentage of grasses are grazed and removed from the ground) are not an acceptable substitute for experienced, on-the-ground management, based on sound, long-term range trend information. This can best be gained with adequate examples of ungrazed sites of sufficient size and distribution from which scientists and BLM land managers can draw adequate comparisons.

46. Statements in the 2025 ARMPA and FEIS ignore the fact that livestock influences are much more than simple utilization of key plants. Trailing, trampling, and dispersal of exotic plant species are also key influences that must be also accounted for (see Figure 1 below). Their statements ignore the tremendous differences in the preference and palatability of different plant species by cattle. The BLM ignores that some plant communities are preferred by cattle over other plant communities (this is the idea of distribution of cattle over a given area or landscape), and it ignores the annual and variability of plant productivity.

47. Valentine (2000) correctly states that "utilization of 50% of a key forage plant species may be achieved by 50% use on all the plants in the population or by 100% use on half of the plants and none on the rest; if the latter, then overgrazing may be serious without the utilization data showing it." The same is clearly true even at a mean utilization rate of 20% or even undetectable utilization levels of herbaceous species. For example, Brookshire et al. (2003) reported highly significant differences in willow (*Salix geyeriana* and *S. boothii*) height, growth rate, and reproduction when comparing lightly grazed sites to ungrazed sites. Here, they reported

it was difficult to detect current-year utilization of herbaceous plants, but found profound differences in the growth and reproduction of these keystone species.

48. Another false and misleading statement made by the BLM in the FEIS is that few plant species show consistent, directional responses to grazing or cessation of grazing. This is absolutely contrary to results throughout the scientific literature. For example, Reisner et al. (2013) reported that cattle grazing intensity was positively associated with the abundance of the alien exotic - cheatgrass (B. tectorum). Kauffman et al (2022) found significant correlations between large ungulate utilization (bison) and exotic species abundance in riparian areas. They also found significant inverse correlations with grazing intensity and the abundance of wetland species and overall plant species diversity.

49. In the study of range management, plants are even classified as to their responses to grazing. These categories include "Increasers," "Decreasers" or "Invaders" based upon their response to grazing by domestic livestock (Society for Range Management 1998). Cattle, like all animals, have distinct preferences in the plant species they consume, and even with so-called "light" grazing the plant communities will be affected. In addition to preference, all plant species have variable responses to defoliation – some recovering while others decline.

50. Exclosure studies in the western USA also clearly show that, where grazing is absent, there is an increase in native species, an increase in species diversity, an increase in wetland obligate species, and declines in exotic species (Kauffman et al. 2022, 2024). These responses were measured even when comparing lightly grazed sites to completely ungrazed sites. Ungrazed controls of sufficient size are necessary to truly understand how domestic livestock affect rangeland ecosystems. This is especially true for the intermountain west.

CONCLUSIONS

51. I have described the importance of ungrazed reference sites for generating baseline information crucial to any scientifically-defensible study or conservation plan. To be effective, ungrazed controls will cover the wide range of plant communities, soil types, topography, ecological condition, microclimates, and topographic variation present on the 12 million acres of sage-grouse range managed by the BLM in Oregon. Unfortunately, the significantly reduced set and size of ungrazed key RNA reference areas in the 2025 ARMPA is wholly inadequate to meet this need. I have described why research in unique, ungrazed sagebrush ecosystems/landscapes is particularly important to the BLM's ability to follow through on its commitment to conserve the greater sage-grouse, including through adaptively managing livestock grazing in agency-identified core habitat areas throughout southeastern Oregon. I have described how time is of the essence for the Bureau to conduct this urgent key RNA research. Time is of great importance especially with respect to climate change, shifting wildfire patterns, and other imminent threats to endangered species. Much of the ARMPA planning area is subject to among the highest increases in temperatures in the continental USA due to climate change (Kauffman 2022a). In addition, it has been demonstrated that domestic cattle grazing strongly contributes to climate change (Kauffman et al. 2022a, 2023a). This includes increases in greenhouse gas emissions, losses in carbon sequestration of native plant communities, and grazing/trampling impacts that increase warmer/drier conditions, thus actually accentuating the effects of climate change (Kauffman 2022, Kauffman et al 2022a, 2022b, 2023a). Climate change and it impacts on the Columbia and Great Basins will be deleterious to sage-grouse populations. Establishment of these reference areas would assist the BLM in

understanding, and then managing for how grazing is interacting with climate change in these landscapes.

52. In my professional judgment, while woefully limiting, the number and extent of ungrazed reference areas established in key RNAs in the 2015 ARMPA are a critical component of the BLM's proposed conservation plan for sage-grouse throughout eastern Oregon. The 83% reduction in ungrazed reference areas now adopted in the 2025 ARMPA is completely inadequate to provide the BLM with the information it needs to manage the 12 million acres of sage grouse range managed by the agency in Oregon.

53. As I have stated, adequate controls are necessary to understand treatment effects. Controls must be an accurate reflection of the population being sampled, and this has been sacrificed in the 2025 ARMPA—just like my inadequate medical study example provided above.

54. Further, the BLM cannot make the general statement that 20% utilization has negligible ecological or compositional effects for the lands in the ARMPA, because there are no ungrazed controls from which to base this conclusion. With future studies using the ungrazed controls within the ARMPA lands BLM could conclude how grazing at different intensities, in different communities affect the composition and structure of their lands. In other words, perhaps the BLM could *someday* draw conclusions about the impacts to sage-grouse of 20% utilization—but without first establishing a *baseline* of *zero percent* reference areas, the actual effect of 20% grazing (or 30% or 10%) is simply unknown, and so the BLM's decisions to allow grazing at one utilization level or another are essentially uninformed.

55. The information that could come from the monitoring and measurements taken at the ungrazed sites established in the 2015 ARMPA, as compared against areas being grazed under various utilization levels and other management parameters (e.g., time of year, duration of

use, and so forth), would be critical for the BLM to manage habitats and populations of the sage-grouse as well as the entirety of the biological diversity under that agency's stewardship responsibility. Conflating low levels of utilization (<20%) with the true baseline that would be generated in *ungrazed* areas is an erroneous assumption that will not provide the information necessary to determine domestic grazing effects on sage grouse habitats. Proceeding under this assumption will even lead to erroneous conclusions resulting in a failure to sustainably manage the resources of the American people. Even at "low" utilization levels cattle are still selectively grazing plants, causing some level of trailing/trampling damage, dispersing exotic seeds, and contributing to climate change (Figure 1).

56. The BLM's decision to reduce both the number and acreage of ungrazed key RNAs in Oregon threatens irreparable harm by eliminating the possibility for establishing meaningful scientific baseline information. Allowing grazing in areas that have been off-limits to cattle for two years or more will destroy the ungrazed scientific baseline, resulting in the loss or at least further delay of valuable information the BLM has said it is lacking and needs in order to manage millions of acres of public land in an informed manner and one that does not hasten the extinction of the greater sage-grouse.

57. In my opinion, the BLM's continued failure to establish and protect an adequate number of specifically-identified ungrazed reference areas and conduct the monitoring/research necessary to quantify management effects on sage-grouse and their habitats is self-defeating and endangers the resources the agency is charged to sustainably manage. Why wouldn't the land management agency entrusted with managing the public's resources not place such critical knowledge and information as a high priority? Immediate establishment of these ungrazed reference areas would be of great value to the BLM, their user-groups, the interested public, and

future generations of Americans who deserve to enjoy and benefit from the unique native biodiversity and productivity of the sagebrush steppe region.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

DATED this 11th day of March 2025.

s/ J. Boone Kauffman

J. Boone Kauffman, Ph.D.

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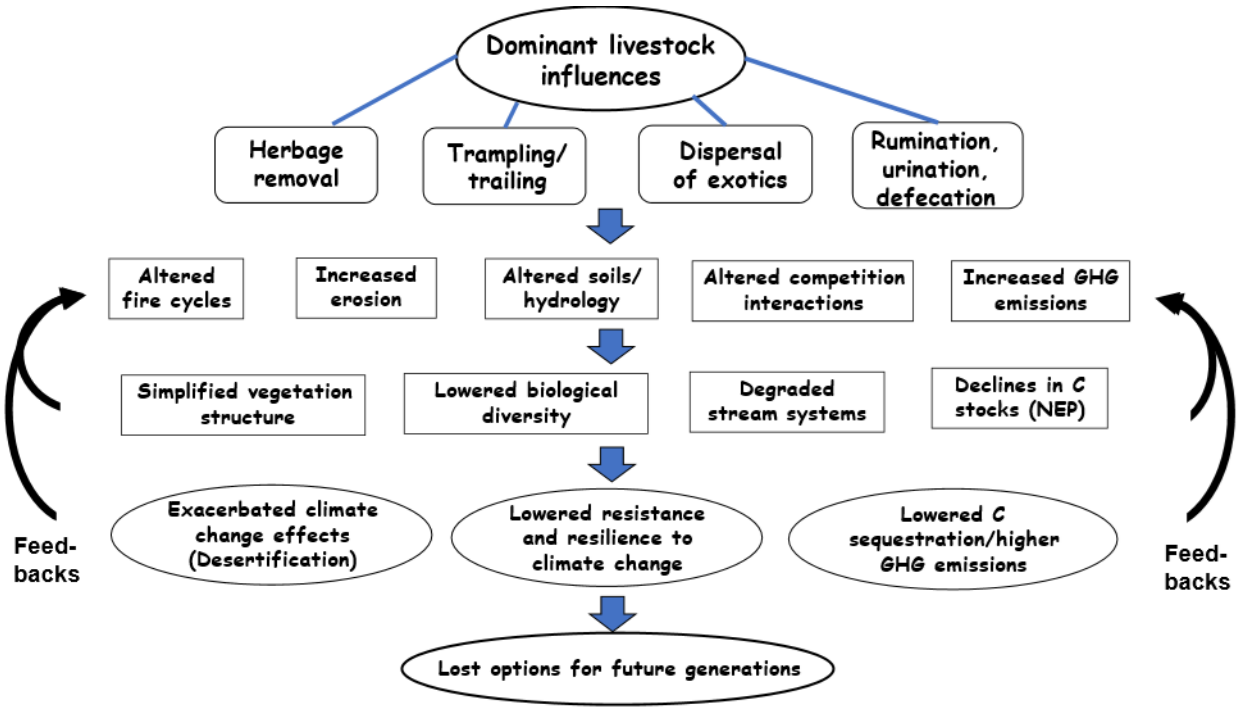

Figure 1. The interacting effects of livestock grazing and climate change on western rangelands. There are four primary immediate effects of livestock: herbage removal, trailing trampling effects, dispersal of exotics, and creation of metabolic and nonmetabolic waste products. Through time, these effects on native rangelands affect fire regimes, increase erosion, compact soils affecting ecosystem hydrology, and alter competitive relationships between plant species. These actions decrease the net ecosystem productivity (NEP) such that the rangelands shift from carbon sinks to net sources of greenhouse gases. Products of animal metabolism are significant additional sources of greenhouse gases, especially CH_4 and N_2O. Ultimately the results of grazing have led to a simplification of vegetation structure typified by increases in exotic, ruderal, and less palatable species, which are more adapted to the drier conditions created by lower water holding capacities of compacted soils. The shifts in species composition further decrease the capacity of rangeland ecosystems to function as carbon sinks. Other impacts of grazing include a decline in riparian vegetation structure, shifts to drier species dominance, and degraded stream channels which increase stream temperatures, ground surface temperatures, and alter stream flows. The consequent shifts in the net ecosystem productivity of the landscape, coupled with GHG additions from livestock, results in additional contributions to the greenhouse gases causing climate change. The effects of livestock accentuate the effects of climate change such as increased stream and air temperatures, loss in biological diversity, and an overall decline in the productivity of rangelands (desertification). There are also strong feedbacks associated with climate change. The warmer and drier temperatures, and reduced snowpack associated with climate change interacts with livestock grazing to negatively affect stream flows, water quality and biological diversity. These factors result in further degradation and a lower capacity for carbon storage, hence higher greenhouse gas emissions (From Kauffman et al. 2022).